

Automotive Relays

TH RELAYS

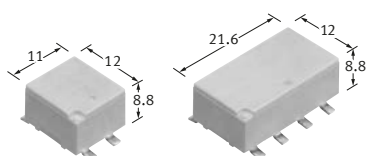
Product Catalog

**IN Your
Future**

TH RELAYS

Miniature PC Board, Twin, 1 Form C, Surface-mount Type Automotive Relay

◁ Protective construction ▷
Sealed/Flux tight



(Unit: mm)

FEATURES

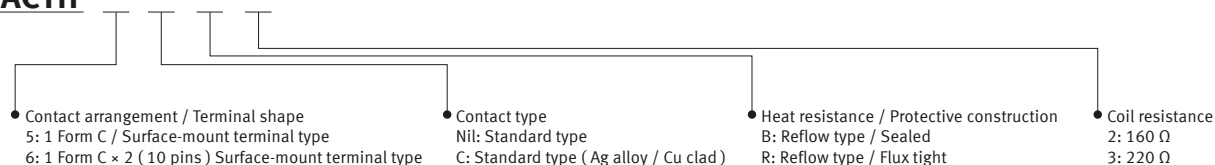
- Compact flat type
< Height > Surface-mount type: 8.8 mm
- Compact and high-capacity 25 A load switching

TYPICAL APPLICATIONS

- Powered windows, Automatic door locks, Powered mirrors, Powered sunroof, Powered seats, Lift gates and Slide door closers, etc.

ORDERING INFORMATION (PART NO.)

ACTH



TYPES

Contact arrangement	Contact type	Rated coil voltage	Coil resistance	Part No.		Packing	
				Protective construction		Carton (1-reel)	Case
				Sealed	Flux tight		
1 Form C	Standard type	12 V DC	160 Ω	ACTH5B2	ACTH5R2	500 pcs.	2,000 pcs.
			220 Ω	ACTH5B3	ACTH5R3		
	Standard type (Ag alloy / Cu clad)		160 Ω	ACTH5CB2	ACTH5CR2		
			220 Ω	ACTH5CB3	ACTH5CR3		
1 Form C × 2 (10 pins)	Standard type		160 Ω	ACTH6B2	ACTH6R2	400 pcs.	
			220 Ω	ACTH6B3	ACTH6R3		
	Standard type (Ag alloy / Cu clad)		160 Ω	ACTH6CB2	ACTH6CR2		
			220 Ω	ACTH6CB3	ACTH6CR3		

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RATING

Coil data

Rated coil voltage	Operate voltage (at 20 °C) (Initial)	Release voltage (at 20 °C) (Initial)	Rated operating current [±10 %] (at 20 °C)	Coil resistance [±10 %] (at 20 °C)	Rated operating power (at 20 °C)	Usable voltage range
12 V DC	Max. 6.5 V DC	Min. 0.6 V DC	75 mA	160 Ω	900 mW	10 to 16 V DC
	Max. 7.7 V DC		54.5 mA	220 Ω	655 mW	

Specifications

Item		Specifications	
Contact data	Contact arrangement	1 Form C, 1 Form C × 2	
	Contact resistance (initial)	Max. 50 mΩ (N.O. side: typ. 4.5 mΩ, N.C. side: typ. 5.5 mΩ) (By voltage drop 1 A 6 V DC)	
	Contact material	Ag alloy	
	Rated switching capacity (resistive)	N.O. side: 20 A 14 V DC, N.C. side: 10 A 14 V DC	
	Max. carrying current* ¹	25 A/10 min (Coil applied voltage 12 V DC, at 20 °C)	
	Min. switching load (resistive) * ²	1 A 14 V DC (at 20 °C)	
Insulated resistance (initial)		Min. 100 MΩ (at 500 V DC, Measurement at same location as " Dielectric strength " section.)	
Dielectric strength (initial)	Between open contacts	500 Vrms for 1 min (Detection current: 10 mA)	
	Between contacts and coil	500 Vrms for 1 min (Detection current: 10 mA)	
Time characteristics (initial)	Operate time (at rated voltage)	Max. 10ms (at 20 °C, without contact bounce time)	
	Release time (at rated voltage)	Max. 10ms (at 20 °C, without contact bounce time) (without protective element)	
Shock resistance	Functional	Min. 100 m/s ² (Half-wave pulse of sine wave: 11 ms; detection time: 10 μs)	
	Destructive	Min. 1,000 m/s ² (Half-wave pulse of sine wave: 6 ms, number of shocks for each direction: X, Y and Z direction: 3 times)	
Vibration resistance	Functional	10 to 100 Hz, Min. 44.1 m/s ² (Detection time: 10 μs)	
	Destructive	10 to 500 Hz, Min. 44.1 m/s ² Time of vibration for each direction; X, Y direction: 2 hours, Z direction: 4 hours	
Expected life	Mechanical	Min. 10 ⁷ (at 120 times/min)	
	Electrical* ⁴	Resistive load	Min. 10 ⁵ at rated switching capacity operating frequency: 1 s ON, 9 s OFF
		Motor load	Min. 10 ⁵ at 25 A 14 V DC motor lock condition operating frequency: 0.5 s ON, 9.5 s OFF
Conditions	Conditions for usage, transport and storage* ³	Ambient temperature: -40 to +110 °C, Humidity: 2 to 85 % RH (Avoid icing and condensation)	
Weight		1 Form C type: approx. 3 g 1 Form C × 2 type: approx. 6 g	

Note) If the relay is used continuously for long periods of time with coils on both sides in an energized condition, breakdown might occur due to abnormal heating depending on the carrying condition. Therefore, please inquire our sales representative when using with a circuit that causes an energized condition on both sides simultaneously.

*1: Depends on connection conditions. Also, this does not guarantee repeated switching. We recommend that you confirm operation under actual conditions.

*2: This value can change due to the switching frequency, environmental conditions, and desired reliability level, therefore it is recommended to check this with the actual load.

*3: The upper operation ambient temperature limit is the maximum temperature that can satisfy the coil temperature rise value. For details, please refer to the " Automotive Relay Users Guide ".

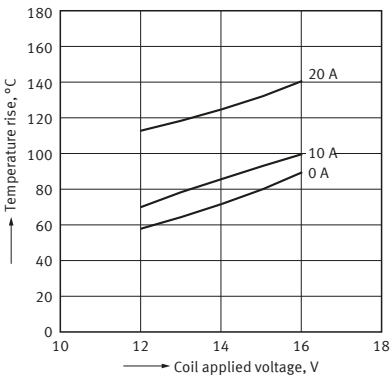
Please inquire our sales representative if you will be using the relay in a high temperature atmosphere (110 °C).

*4: Do not use for lamp loads, electric discharge lamp loads, any other lamp loads and capacitor loads. Please inquire our sales representative for details.

REFERENCE DATA

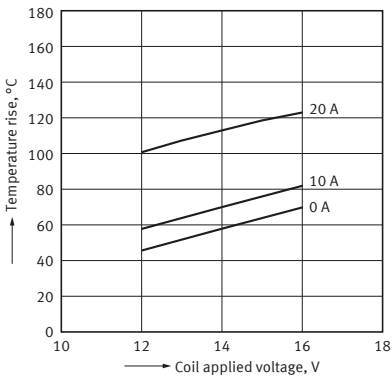
1-1. Coil temperature rise
(at room temperature)

Sample: ACTH6B2, 3 pcs.
Carrying current: 0 A, 10 A, 20 A
Ambient temperature: Room temperature



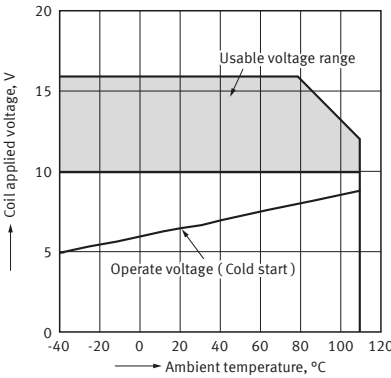
1-2. Coil temperature rise
(at 110 °C)

Sample: ACTH6B2, 3 pcs.
Carrying current: 0 A, 10 A, 20 A
Ambient temperature: 110°C



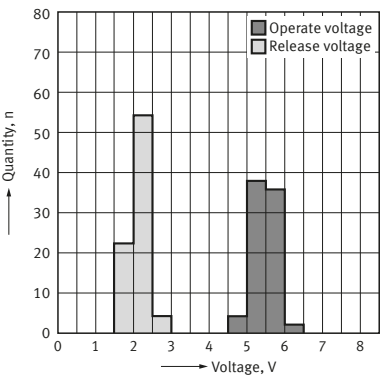
2. Ambient temperature and usable voltage range

Sample: ACTH6B2



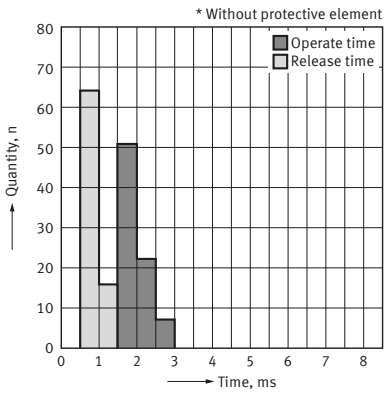
3. Distribution of operate and release voltage

Sample: ACTH6B2, 40 × 2 pcs.



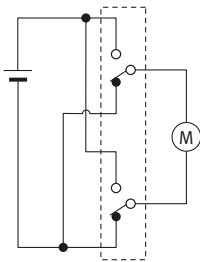
4. Distribution of operate and release time

Sample: ACTH6B2, 40 × 2 pcs.

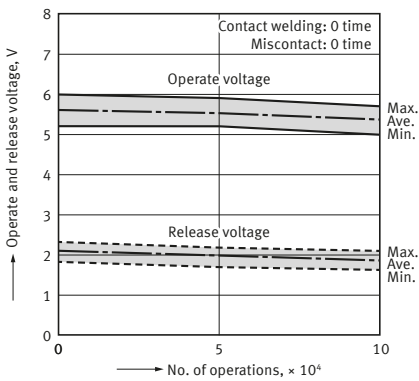


5. Electrical life test (Motor lock)

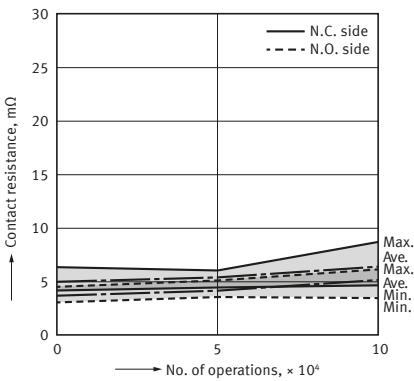
Sample: ACTH6B2, 3 pcs.
Load: 25 A 14 V DC
Power window motor actual load (lock condition)
Operating frequency: ON 0.5 s, OFF 9.5 s
Ambient temperature: Room temperature
Circuit:



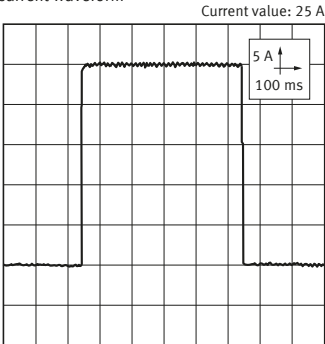
Change of operate and release voltage



Change of contact resistance



Load current waveform



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DIMENSIONS (Unit: mm)

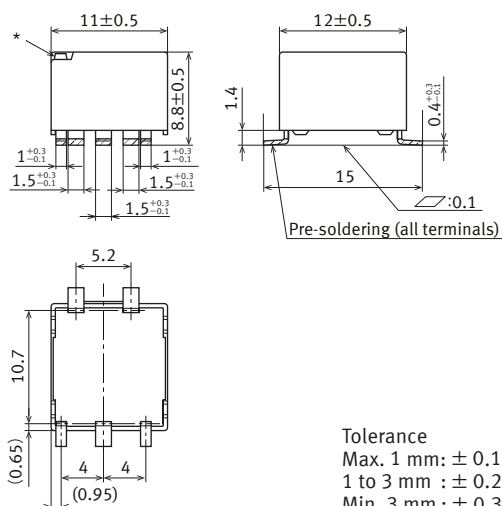
CAD The CAD data of the products with a " CAD " mark can be downloaded from our Website.

■ 1 Form C type

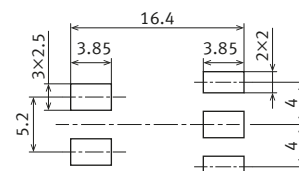
CAD



External dimensions

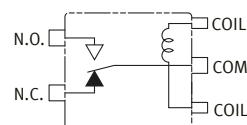


Recommendable mounting pad (TOP VIEW)



Tolerance: ± 0.1

Schematic (TOP VIEW)

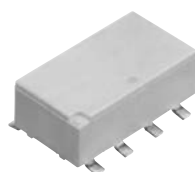


Tolerance
Max. 1 mm: ± 0.1
1 to 3 mm : ± 0.2
Min. 3 mm : ± 0.3

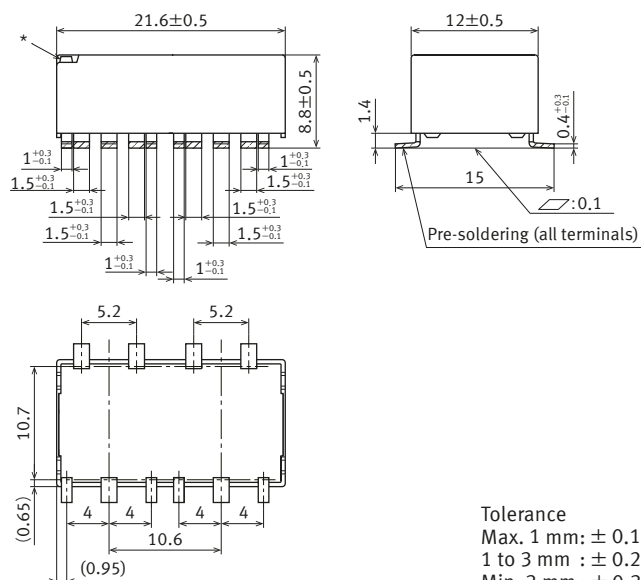
Note: * Flux tight type has air hole.

■ 1 Form C × 2 type

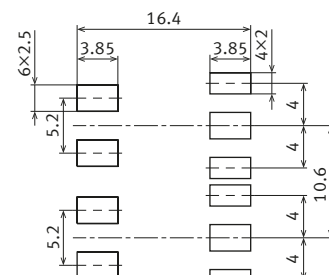
CAD



External dimensions

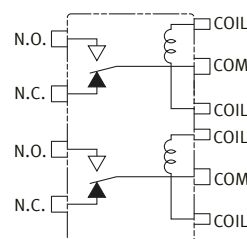


Recommendable mounting pad (TOP VIEW)



Tolerance: ± 0.1

Schematic (TOP VIEW)



Tolerance
Max. 1 mm: ± 0.1
1 to 3 mm : ± 0.2
Min. 3 mm : ± 0.3

Note: * Flux tight type has air hole.

GUIDELINES FOR USAGE

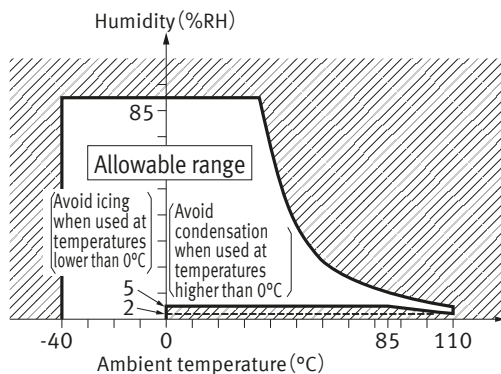
■ For general cautions for use, please refer to the "Automotive Relay Users Guide".

■ Precautions when using TH relays

● Usage, transport and storage conditions

- 1) Ambient temperature, humidity, and air pressure during usage, transport of the relay:
 - (1) Temperature: -40 to $+110^{\circ}\text{C}$
 - (2) Humidity: 2 to 85% RH
(Avoid icing and condensation.)
 - (3) Air pressure: 86 to 106 kPa
The humidity range varies with the temperature.
Use within the range indicated in the graph.

[Temperature and humidity range for usage, transport, and storage]



2) Water condensation

Water condensation occurs when the ambient temperature drops suddenly from a high temperature and humidity, or the relay is suddenly transferred from a low ambient temperature to a high temperature and humidity. Condensation causes the failures like insulation deterioration, wire disconnection and rust etc. Panasonic Industry does not guarantee the failures caused by condensation. The heat conduction by the equipment may accelerate the cooling of relay itself, and the condensation may occur. Please confirm no condensation in the worst condition of the actual usage. (Special attention should be paid when high temperature heating parts are close to the relay. Also, please consider the condensation may occur inside of the relay.)

3) Icing

Please check the icing when an ambient temperature is lower than 0°C . Icing means, the moisture contained in the surrounding environment and inside the relay freezes when the ambient temperature falls below the freezing point. The icing causes the sticking of movable portion, the operation delay and the contact conduction failure etc. Panasonic Industry does not guarantee the failures caused by the icing. The heat conduction by the equipment may accelerate the cooling of relay itself and the icing may occur. Icing condition is changed by ambient environment, please make sure to confirm no icing in the worst condition of the actual usage.

4) Low-temperature, low-humidity atmosphere

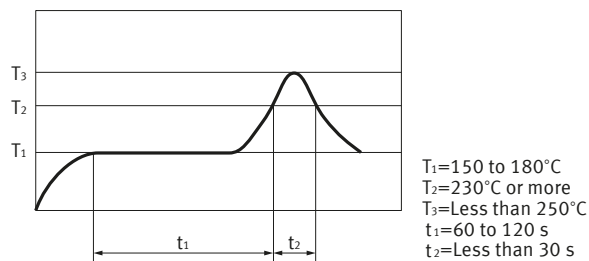
The plastic becomes brittle if the relay is exposed to a low temperature, low humidity environment for long periods of time.

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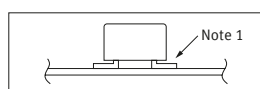
● Mounting and cleaning conditions for Surface-mount terminal type relays

When soldering this relay, please observe the following conditions.

Recommended condition	
Number of reflows	1 time
Measurement location	Terminal temperature



Position of measuring temperature



Temperature profile indicates the temperature of the soldered part (Note 1) of terminals on the surface of the PC board, however, for other areas such as the surface of relay case, make a setting so that you do not exceed the recommended conditions.

*The temperature of the relay exterior and interior may be extremely high depending on the component density on the board, the heating method of the reflow oven or circuit board type.

● Other cautions during reflow soldering

- (1) Reflow performance may be affected if you carry out soldering in a way that exceeds the recommended conditions. If you need to exceed the recommended conditions when soldering, please inquire our sales representative before using in an application.
- (2) Please confirm the heat stress of relay by using actual board because it may be changed by board condition or manufacturing process condition.
- (3) Solder creepage, wettability, or soldering strength will be affected by the changing of soldering condition or used solder type. Please check them under the actual production condition in detail.
- (4) Avoid cleaning (ultrasonic cleaning, boiling cleaning, etc.) and coating in order to prevent negative impacts on relay characteristics.

Please refer to " **the latest product specifications** " when designing your product.

•Requests to customers:

<https://industry.panasonic.com/global/en/salespolicies>

■ Global Sales Network Information: industry.panasonic.com/global/en/salesnetwork/globalnetwork

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